

*Cautionary Signals.*—178 Cautionary Signals were displayed during the month, of which 110, or 61.8 per cent, were justified. 42 Cautionary Off-shore Signals were displayed, and of these 30, or 71.4 per cent, were justified as to direction; 17, or 40.5 per cent, were justified as to velocity. Of the Cautionary Off-shore Signals 20 were changed from Cautionary. 220 signals of both kinds were displayed, of which 126, or 57.3 per cent, were fully justified. The above does not include signals ordered at 47 display stations, where the velocity is only estimated and not measured. 54 cases were reported of winds of 25 miles or over where signals were not ordered; in only 12 of these cases did the winds exceed 30 miles per hour.

## NAVIGATION.

*Stage of Water in Rivers.*—In the table on the right-hand side of chart No. III are given the highest and lowest readings of the Signal Corps river gauges for the month, with the dates. No case has been reported of the rivers reaching danger line during the month. The Upper Mississippi was lowest during the early part of the month, and the Ohio was lowest during the latter portion of the month. Dubuque, Ia., 30th, the excellent stage of water in the river brought down a great quantity of logs and gave work to all mills. The Black river, Wis., on the 14th, rose 10 feet, producing the highest water for 10 or 12 years. Pittsburgh, 31st, "on account of low water during past few weeks it has been impossible to float loaded barges down the river."

*Ice on Lakes, Rivers, &c.*—Marquette, Wis., 8th, navigation opened; heavy ice reported beyond the Sault Sainte Marie Canal, but not preventing navigation. Buffalo, N. Y., 1st, several vessels forced their way through ice, outward bound; 2nd, harbor closed by ice; 5th, ice in harbor 3 feet thick; 7th, ice softening and vessels passing out; 9th, large masses of floating ice passing down Niagara river; 15th, ice firm navigation suspended; 16th, ice broke up; 20th, no ice observed on lake.

*High Tides.*—Cape Lookout, N. C., very high tide on the 3rd.

## TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors, with average depth when observations were taken, are given in table on chart No. II. Observations were interrupted at the following places on the dates indicated: on account of rough water, Cleveland, 25th and 26th; on account of loss of thermometers, San Francisco, 1st to 31st, Milwaukee, 13th to 29th, New London, 16th to 31st, Augusta, Ga., 1st to 4th.

## ATMOSPHERIC ELECTRICITY.

*Thunder Storms.*—1st, Me., Dak., Ga., Tex.; 2nd, La.; 3rd, Dak., Tex., Ia., Mo., Ill., Kan., Neb.; 4th, Ind. Ty., Tex., Miss., Mo., Ohio, Ill., Tenn., Ala., Ark., Neb., Ohio, Va.; 5th, Ind. Ty., Tex., Ala., Md., Ark., Ga., Mass., N. J., N. Y., Vt.; 6th, Col., Tex., La., Ala., Ga., Conn., N. Y., Ark., Miss., N. J.; 7th, Neb., Fla., N. C., Ala., Mich.; 8th, Dak., Fla.; 9th, Ia., Minn., Dak., Mo.; 10th, Dak., Ia., Minn., Wis., Ill., Mich., Pa.; 11th, Col., Wyo., Neb., Tex., Fla., Ia., Wis., Mich., Minn., Dak., Ill., Mo.; 12th, Neb., Dak., Tex., Minn., Mich., Ill., Mo.; 13th, Cal., Kan., Dak., Ia., Mo., Wis., Ohio, Mich., Penn., Ky., Ill., Tenn., N. C., Mo., Ala., Ind., Me., Neb., Tex., Vt.; 14th, Col., Ill., Ohio, N. Y., Tenn., Me., Ala., Ind., Ia., Kan., Mich., Mo., Vt.; 15th, Tex., Fla., N. Y., Penn., Ohio, Ky., Ill., Tenn., Ga., N. C., Ind., Va.; 16th, Neb., Kan., Tex., Fla., N. C., Ga., N. Y., Mass., Md., Conn., N. J., Penn., Vt., Va.; 17th, Col., Fla., La., N. C., Ga., Dak., Neb., Kan., Md., N. J., Pa., S. C., Va.; 18th, La., Fla., N. C., Ga., Va., Penn., Mass., Ia., Kan., Md., Mo., Neb., N. J., S. C.; 19th, Neb., Kan., Dak., Ia., Ga., Va., Me., Ala., Ill., Md., Mo., N. J., N. C., Ohio, Pa.; 20th, Ind. Ty., Fla., Mo., Mich., Ky., Tenn., N. C., Ga., Va., Vt., Kan., N. J., Pa.; 21st, Cal., Neb., Dak., Miss., Fla., N. C., N. J., Va., Penn., Mass., Conn., Me., Md., N. Y., S. C., Tenn., Vt.; 22nd, Kan., Dak., Tex., Ga., N. Y., Ia.; 23rd, Dak., Miss., Ala., Fla., Minn., Ga., Kan., Mo., Neb.; 24th, Cal., Tex., Ia., Wis., Mich., Neb., Wyo. Ty., Dak., Ill., Ind., Mo., Ohio; 25th, Dak., Ia., Wis., Ill., Ohio, Penn., Ind., N. Y., Conn., Kan., Md., Mich., N. J., Va., W. Va.; 26th, Ohio, Ky., Ill., Ind., N. C., Ia., Kan., Mich., Mo., N. M.; 27th, Ia., Ill., N. C., Kan., Neb., Pa., S. C.; 28th, Tex., Minn., Wis., Dak., Ill., Ind., Ia., Mich., Neb., N. C., Va.; 29th, Kan., Dak., Minn., Ia., Minn., Mich., Ky., Ind., Ill., Mo., Neb., N. C., Ohio, W. Va.; 30th, Ind. Ty., Tex., Miss., Ia., Mo., Wis., Mich., Ohio, Ill., Kan., Neb., N. Y.; 31st, Tex., Ia., Mo., Wis., Mich., N. Y., Penn., Ill., Tenn., Mass., Ark., Ind., Kan., Miss., Neb., Ohio, W. Va.

*Auroras* were observed on the following dates: 7th, Starkey, N. Y.; 11th, Vevay, Ind.; 12th, Thornville, Mich.; 13th, Pembina, Dak.; 17th, Pembina, Dak.; 20th, Pembina, Dak., Starkey, N. Y.; 21st, Philadelphia; 23rd, Bismarck, Dak., NE., 10 p. m., Eastport, Me., Monticello, Iowa, Gardiner, Me., Woodstock, Vt.; 24th, Newburyport, Mass.; 25th, Bangor, Me., from 10 p. m. until 2:45 a. m., Starkey, N. Y.; 26th, Cambridge, Mass., regularly looked for at 8 p. m., none seen; cloudy on 2nd, 3rd, 4th, 6th, 7th, 12th, 13th, 16th, 17th, 18th, 19th, 24th, 25th, 27th, 30th; moonlight, 1st, 5th; twilight strong last half of month.

*Telegraphic Communication Interfered with by Atmospheric Electricity.*—Santa Fe, N. M., 4th, 26th; Colorado Springs, Col., 26th; Pikes Peak, Col., 27th; St. Paul, Minn., 12th.

## OPTICAL PHENOMENA.

*Solar Halos.*—1st, Utah, Ill. 2nd, Dakota, Fla. 3rd, Utah, Ohio, Mich., N. J. 4th, Ohio, Ind. 5th, Utah, Me., Ill., N. C., Va., Conn., Ia., Mass., Neb., N. J. 6th, Utah, Ia., Ohio, Ill., Conn., Me., N. H., N. J.

7th, Ia., Minn., Conn., Ind. 8th, Dak., Ia., Wis., Ill. 9th, Ia., Ill., Ohio., N. Y. 10th, Ohio, N. Y., Me., Ind., Neb. 11th, Ia., Mo., Ind., Ohio. 12th, Cal., Dak., Ia., Mo. 13th, Ia. 15th, Ohio, Conn., Ill., Neb., N. Y. 17th, Ia. Ohio, Mass., Neb., N. C. 18th, Ia., N. C., Mass., N. J. 19th, Ia. N. Y. 20th, Ia., Tenn. 21st, Nev., Dak., Ia., Minn., Ohio, Ind. 22nd, Fla., Ia., Ohio. 23rd, Tex., Fla., Ia. 24th, Nev., Ia. 25th, Mich., Ohio, Ind. 26th, Cal., Utah, N. C., Nev., N. J., Penn. 27th, Utah, Nev., Ia., Tenn., Cal., Ind., Me. 28th, Ohio, Dak. 29th, Dak., Ia., N. Y., N. J. 30th, Tex., Ia., Wis., Ill., Mich., N. Y. 31st, Fla., Ala., Ia., Ga.

*Lunar Holo.*—1st, N. Y., Ill., Va., Mass. 2nd, Iowa, Minn., Mo. 3rd, Utah, Kan., Tex., N. C., Va. 4th, Dak., Tex., Ohio, Ill., N. C., Me., Cal., Ind., Md. 5th, Tex., Ala., Fla., Iowa, Ohio, Ky., Ill., Tenn., Ind., Penn., Va. 6th, Mo., Ohio, Va. 8th, Mich. 9th, Mich. 11th, Tex. 14th, Ohio, Ind. 23rd, Mo. 24th, Nev., Tex., Tenn., Ind., Ill. 26th, Nev., Iowa, Ill., Mass., Mo., Tex. 27th, Dak., Fla., Iowa, Mo., Ky., Ill., Ind., Ohio. 28th, Ind. Ty., Dak., Minn., Tenn., Ga., N. C., N. J., R. I., Mass., Ill., Mich., Neb., N. Y. 29th, Tex., Tenn., Ga., Ill., Mich., N. J., Va. 30th, Tex., Ala., La., Mo., Ind., Ga., Me., Mass., N. J. 31st, Tex., Ala., Fla., Mo., Ga., Conn., Mass., Penn.

## MISCELLANEOUS PHENOMENA.

**BOTANICAL.**—*Connecticut*—Southington, in bloom, 8th, sugar maple, 14th cherry. 18th, pear, apple; New London, in bloom, 10th, wistaria, 12th, lilac, 14th, horsechestnut, maple, elm. *Georgia*—Thomasville, a dry month; oats and wheat all harvested, average crop. Cotton caterpillar observed in three cases in Thomas County during the month. *Illinois*—Louisville, corn, oats and flax one month later: Peorio, in bloom, 6th, wild cherry; Highland, 14th, first ripe strawberries; 18th, grape vines in bloom; 29th, cut worms damaging corn; 31st, wheat looks poorly. *Indiana*—St. Meinrad, 20th, grapes in bloom, Arlington, in bloom, 2nd, hickory, 19th, walnut, 24th, red and white clover. *Indian Territory*—Fort Gibson, 18th, new irish potatoes in market. *Iowa*—Nora Springs, in bloom, 2nd, cherry, 17th, mandrake. Monticello, 1st, catkins on willow; 12th, farmers commenced cultivating corn: in bloom, 4th, cherry, 11th, lilac, 13th, snowball, showberry. Independence, ripe, 7th, strawberry, 24th, potatoes, 26th, raspberry. Fort Madison, in bloom, 18th, strawberry, black walnut, 7th, locust; 19th, ripe strawberries in market. Prof. Gustavus Hinrichs, of the Iowa Weather Service, reported crops at end of month much better than apprehended during the drought of first part of month; corn, equal or above average over two-thirds of state, below average in southwest and northeast; hay and pasture good in northwest and middle portions, below in southwest and east; wheat and oats below average, having suffered most in northwest, southwest and east. *Kansas*—Independence, blooming, 2nd, peas, 15th, hickory, walnut, 30th, catalpa, 31st, flax. Topeka, 5th, yellow rose in bloom. *Maine*—Cornish, leafing, 3rd, lilac, 10th, birch, maple, poplar, horse chestnut, 11th, forest trees. West Waterville, in bloom, 15th, plum, cherry, 21st, apples. Gardiner, in bloom, 28th, lilac; season more forward than last year. *Maryland*—Emory Grove, in bloom, 20th, rose, 30th, potato; in head, 12th, wheat, 15th, rye; 28th, strawberries ripe; 30th, corn up. *Massachusetts*—Somerset, in bloom, 1st, wild flowers and feverbush, 10th, cherry, 13th, pear, 14th, peach, plum, 17th, apple, 19th, lilac, 24th, quince, 1st, blue violet, cowslip, adder's tongue, anemone, 10th, columbine, 15th, buttercup, 20th, solomon's seal; 6th, asparagus for table use; 30th, rye in head. Fall River, in bloom, 6th, cherry, 8th, peach, 9th, pear, 12th, strawberry, 14th, apple. Westborough, in bloom, 11th, cherry, 12th, peach, 14th, apple. Springfield, in bloom, 12th, peach, plum, 13th, pear. Rowe, 28th, apple in bloom. Waltham, in bloom, 2nd, red maple, 6th, willow, 8th, marigold, dandelion, 10th, anemone, 12th, cherry, 13th, shad bush, white birch, 14th, peach, pear, 16th, gooseberry, blueberry, 17th, sassafras, 18th, apple, 20th, black oak, chokeberry, 21st, lilac, horse chestnut, 25th, buttercup, wild geranium, 29th, barberry, white thorn, 30th, blackberry, 31st, sweet viburnum, black cherry; leafing, 5th, black cherry, choke cherry, barberry, willow, meadow sweet, and sweet viburnum, 8th, horse chestnut, sugar maple, 10th, pear, white thorn, 11th, apple, 12th, white birch, 13th, red oak, red maple, 14th, raspberry, gooseberry, 24th, forest trees. New Bedford, leafing, 2nd, lilac, willow, 19th, elm, oak; in bloom, 2nd, anemone, 5th, magnolia, 6th, wild strawberry, 8th, peach, 12th, pear, buttercup, 15th, apple, 18th, lily of the valley, 19th, dogwood, 25th, solomon's seal; ripe, 2nd, asparagus. *Michigan*—Litchfield, all small fruit prosperous. Northport, in bloom, 16th, early cherry, 17th, shadbush, plum, wild cherry. Thornville, in bloom, 8th, juneberry, 9th, cherry, peach, 11th, plum, 12th, poplar; leafing, 2nd, elm, willow, apple, 6th, wild cherry, whitethorn, 12th, white oak. *Hudson*, 1st, cherry in bloom. *Mississippi*—Brookhaven, in bloom, 1st, magnolia, 7th, lily; 3rd, lily budding; 17th, blackberry ripe. Fayette, in bloom, 7th, black walnut, morning glory; 20th, may apple ripe. *Missouri*—Oregon, in bloom, 1st, indian turnip, morning glory, shellbark, hickory, black walnut, 2nd, blue larkspur, 3rd, persian lilac, 5th, sweet shrub, 6th, snowballs, horse radish, 8th, white walnut, 9th, pear, 10th, blue grass, wild cress, sage, 11th, star of bethlehem, yellow locust, 12th, flowering locust, 13th, red and yellow raspberries, 14th, doolittle raspberry, 15th, wild blackberry, 16th, orchard grass, 17th, brandywine raspberry, 18th, rose peony, red clover, 19th, clinton grapes, 20th, solomon's seal, beauty of hebron, early rose potato, 21st, thyme, 22nd, philadelphus, 24th, syringa, curled cress, parsnip, 26th, radish, canada victor tomato, 27th, rose, scarlet phlox, wild buckwheat, 28th, calistgea, white larkspur, 24th, dogwood, dwarf prairie rose, 30th, may weed; 2nd, blue grass heading; 4th, wild strawberry begins to ripen; 14th, farmers cultivating corn; 17th, strawberry begins to ripen. 31st, blue grass seed begins to ripen. *Nebraska*—Clear Creek, 13th, farmers planting corn. *New Hampshire*—Dunbarton, 26th, apple in bloom; season very backward. Contoocookville, in bloom,